

brown, with coxæ blackish, and tarsi together with intermediate and posterior femora, obfuscate. Legs of ♂ lighter colored, with coxæ unicolorous with legs; posterior tibiae at tip, and posterior tarsi dusky. Tegulae piceous. Wings subhyaline; veins and stigma deep brown. Ovipositor nearly as long as abdomen; sheaths piceous.

Described from four specimens (3 ♀, 1 ♂) bred from cocoons found in connection with *Megilla maculata*.

The cocoon is of a clear reddish brown color, 4 mm. long by 2 mm. wide. Its texture is compact, except that there is considerable loose silk on the outside.

## COSMOPOLITAN BUTTERFLIES.

BY SAMUEL HUBBARD SCUDDER, CAMBRIDGE, MASS.

Strictly speaking, there is no such thing as a cosmopolitan butterfly; yet there is one species, *Vanessa cardui*, which may well merit that name, since it is found in every quarter of the globe with the exception of the arctic regions, a part of South America and most of the West India islands; there are also other butterflies whose recent extension naturally leads to the inquiry, What should prevent their spreading over the entire globe, or what are the elements that enable a butterfly to gain and maintain a foothold in so many diverse regions.

Let us look for a moment at the peculiarities of distribution of this nearly cosmopolitan butterfly. It belongs to a subdivision of the genus *Vanessa*, the members of which (with the sole exception of this cosmopolitan species) are found exclusively in the New World; while the antithetical section (with the single exception again of one member found both in Europe and the United States) is exclusively confined to the Old World. Judging from this fact we

may venture to assert with considerable confidence that this cosmopolitan butterfly originated in America. *Yet it is just on this continent that its distribution is most limited!* It is known in only a comparatively small portion of South America and occurs on none of the West India islands, with the exception of Cuba, where it is rare. The cause of this limitation cannot be attributed to the food plant of the caterpillar; for the thistles upon which it lives are quite as abundant in these regions as in many others which it has invaded, certainly sufficiently abundant for all its uses. Nor can the heat of the tropics be placed as a difficulty in the way, since there is no place where it flourishes more abundantly than in the tropics and subtropics of the Old World, repeated invasions of Europe by hordes from the south where they had outgrown their opportunities being already on record.

Assuming, then, America to have been its original home, it would seem

as if we might fairly conclude that a butterfly of a dominant type, after its distribution in the region of its birth had reached its limits (the balance between the competitors in the struggle for existence being fairly struck), on being introduced into a new world, where it had to contend in the struggle for supremacy with none of the members of its own restricted group, which had stood in its way in its native home, would suddenly find that it had reached a region ready for conquest and would spread therein with such success as to completely overrun that division of the world.

That this is a probable picture of events which actually transpired in this instance, the result of which we see to-day, is rendered more probable by other events which have taken place under our very eyes, which, though not strictly parallel, seem to have a lesson. *Pieris rapae*, originating in the Old World among a circle of relatives far greater than exists in North America, relatives whose natural food plant is precisely its own, has been suddenly transported to America, where the group to which it belongs is much more poorly represented in species, all feeding upon plants of the same family; and though there are among them species of the genera *Pontia* and *Pieris* having intimate relationship with forms which have more or less successfully contended with *rapae* in their own home, the inexperience of the American species with such a rude antagonist has made them no match for it; so that in the mere quarter of a century since its introduction it has spread

over half the territory of the United States, doing now vastly more injury than all the others of its own tribe combined and contending with them so successfully that their scarcity where formerly abundant is everywhere noticed. In this latter instance commercial agencies are amply sufficient to explain the introduction of this butterfly into our country. It is, however, an insect dependant upon a group of food plants which forbid its passage into the tropics and so will prevent its spread over more than the north temperate zone.

It is plain that no butterfly can become cosmopolitan whose caterpillar does not feed upon plants found in all quarters of the globe. Yet this is plainly not a sufficient cause for distribution. As a proof of this it may be pointed out that one of the most polyphagous of our butterflies, *Jasoniades glaucus*, which has an unusually extended distribution in North America, where it has several allies, has never become cosmopolitan; while plants to which it might easily adapt itself are found in every quarter of the globe. Moreover, the alliances of the genus are wholly with tropical American forms and its ancestors unquestionably originated in that part of the world; yet the genus is not found in the tropics. Nor has it ever spread to the Old World; at the same time there are other genera of the same tribe, not distantly related, which do possess members in both the New and Old Worlds, whose food is of a much more restricted range; such are the genera *Iphiclidides* and *Papilio*.

We have another instance of possible cosmopolitanism which is perhaps more

remarkable than any of the others, in the spread, known to be recent, of *Anosia plexippus* which feeds only upon *Asclepiadaceae*, a group of plants found all over the world in temperate and torrid regions. It is remarkable, because *Anosia* belongs to a section of the sub-family nearly all whose other members belong to the Old World, and yet it is in the Old World that it is now achieving its success. In ancient times, some offshoot of the Old World type found its way to the new continent, spread and multiplied, so long a time ago as to have now become differentiated into several different species and genera, one of which, reintroduced through commercial agencies into the home of its forefathers, bids fair to rival its ancient allies. Here then we have a butterfly which may yet become as cosmopolitan as *Vanessa cardui* is to-day, or only less so from its inability to perpetuate itself in regions with severely cold winters.

I do not find among our butterflies any other instance which seems to me likely to aspire to similar honor. But it may be pointed out that *Pieris rapae* is by no means so destructive in Europe as is another butterfly of the same group, *Mancipium brassicae* whose caterpillars, being semigregarious, are capable of much more mischief. Should this butterfly be transported to America (and its chances of such transportation seem to be equally good with those of *Pieris rapae*), it would probably outdo the ravages of *Pieris rapae* and spread as far as it.

Considering the relative abundance in individuals of the species of *Rhodoceri* above that of those of any other tribe of butterflies, the prevalence of *Eurymi* in the north temperate regions, and that of *Callidryades* in the tropics of the New World, it seems a little surprising that we have among them no single species which has a range at all extraordinary, and no example of widespread distribution through two hemispheres. At least such must be the judgment of one who cannot look upon two forms having an entirely different development in two hemispheres, as holding any right to be considered otherwise than as now distinct species. But there are others who claim an identity of species between some of the forms of *Eurymus* on the two northern continents. In one case, indeed, it would appear that one of our common species of *Eurymus*, *E. philodice*, was introduced by some accident into England, and flourished there for a brief while, but speedily became extinct.

It seems almost equally surprising, considering the dependence of insects upon their food plants, that we find not a single instance of any remarkable distribution among butterflies feeding in their caterpillar state upon *Leguminosae* or upon grasses, although a very considerable number of butterflies affect these particular groups. It is, therefore, plain that besides the universal distribution of its larval food plant, something more is needed to open before any butterfly the possibilities of a cosmopolitan life.